

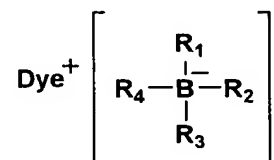
What is claimed is:

1. A holographic recording medium comprising a first substrate and a second substrate having a holographic recording layer between the first substrate and the second substrate, the holographic recording layer containing:

- (A) a binder compound having a reactive group;
- (B) a polymerizable compound having an ethylenic double bond;
- (C) a photoinitiator; and
- (D) a cross-linking agent which reacts with the reactive group in the binder compound,

wherein the photoinitiator contains a compound represented by Formula (1):

Formula (1)

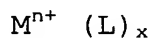


wherein Dye^+ is a cationic dye, each R^1 to R^4 is independently a substituted or unsubstituted alkyl, aryl, aralkyl, alkenyl, alkynyl, heterocyclic group, or a cyano group, provided that two or more of R^1 to R^4 can form a ring.

2. The holographic recording medium of claim 1, wherein at least one of R^1 to R^4 in Formula (1) is a substituted or unsubstituted alkyl, aralkyl, alkenyl or alkynyl group; and at least one of R^1 to R^4 is a substituted or unsubstituted aryl or heterocyclic group.

3. The holographic recording medium of claim 1, wherein Dye⁺ in Formula (1) is a dye selected from the group consisting of methine dyes, polymethine dyes, triarylmethane dyes, indoline dyes, azine dyes, thiazine dyes, xanthene dyes, oxazine dyes, acridine dyes, cyanine dyes, carbocyanine dyes, hemicyanine dyes, rhodacyanine dyes, azomethine dyes, styryl dyes, pyrylium dyes, thiopyrylium dyes and metal complex compounds represented by Formula (2):

Formula (2)



wherein M is a metal atom, n is an integer of 1 to 4, L is a ligand and x is an integer of 1 to 6.

4. The holographic recording medium of claim 3, wherein L in Formula (2) is a dye capable of coordinating with M, provided that a coordination number of L with M is 2 or more.

5. The holographic recording medium of claim 1, wherein the cross-linking agent contains a siloxane bond or a fluorine-carbon bond in the molecule.

6. The holographic recording medium of claim 1, wherein the reactive group in the binder compound is selected from the group consisting of a hydroxy, mercapto, carboxyl, amino, epoxy, oxetane, isocyanate, carbodiimide, oxadiazine, and metal alkoxide group.

7. The holographic recording medium of claim 5, wherein the binder compound is a liquid at 20 °C or has a melting point of not more than 50 °C.

8. The holographic recording medium of claim 1, wherein the polymerizable compound contains an acryloyl or methacryloyl group in the molecule.

9. The holographic recording medium of claim 1, wherein the polymerizable compound has a refractive index of not less than 1.55.

10. The holographic recording medium of claim 1, wherein a thickness of the first substrate (d1), a thickness of the second substrate (d2) and a thickness of the holographic recording layer (Dh) satisfy the following formula:

$$0.15 \leq Dh / (d1 + d2) \leq 2.0$$

11. The holographic recording medium of claim 10, wherein the thickness of the holographic recording layer (Dh) is 200 μm to 2.0 mm.

12. The holographic recording medium of claim 10, wherein the thickness of the first substrate (d1) and the thickness of the second substrate (d2) satisfy the following formula:

$$d1 \leq d2$$

13. The holographic recording medium of claim 1, wherein the first substrate is transparent and has an antireflective outer surface and an inner surface, the antireflective outer surface being opposite to the inner surface and the inner surface facing the holographic recording layer.

14. The holographic recording medium of claim 1, wherein the first substrate is a glass plate.

15. The holographic recording medium of claim 1, wherein an inner surface or an outer surface of the second substrate is coated with a reflective layer having a reflective index of not less than 70%, the inner surface being a surface which has the holographic recording layer thereon.

16. The holographic recording medium of claim 1, wherein a shape of the holographic recording medium is a disc form.

17. The holographic recording medium of claim 1, wherein a shape of the holographic recording medium is a card form.

18. A method of forming a holographic image using a holographic recording medium comprising a first substrate and a second substrate having a holographic recording layer between the two substrate, the holographic recording layer containing:

(A) a binder compound having a reactive group;

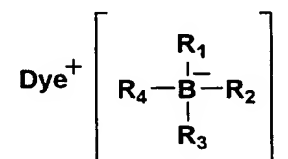
(B) a polymerizable compound having an ethylenic double bond;

(C) a photoinitiator;

(D) a cross-linking agent which reacts with the reactive group in the binder compound,

wherein the photoinitiator contains a compound represented by Formula (1):

Formula (1)



wherein Dye^+ is a cationic dye, each R^1 to R^4 is independently a substituted or unsubstituted alkyl, aryl, aralkyl, alkenyl, alkynyl, heterocyclic group, or a cyano group, provided that two or more of R^1 to R^4 can form a ring, the method comprising the steps of:

(i) irradiating the holographic recording medium with a first light so as to cross-link the binder compound and the cross-linking agent, provided that the first light has not a property of activating the photoinitiator;

(ii) irradiating the holographic recording medium with a second light based on information to be recorded so as to activate the photoinitiator;

(iii) polymerizing the activated photoinitiator with the polymerizable compound(B) to form the holographic image.

19. The holographic image forming method of claim 18, comprising further the step of:

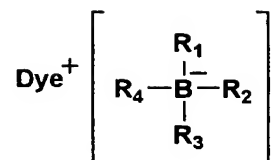
(iv) irradiating the holographic recording medium with a light or subjecting the holographic recording medium so as to stabilize the holographic image after completion of the step (iii).

20. A method of forming a holographic image using a holographic recording medium comprising a first substrate and a second substrate having a holographic recording layer between the two substrate, the holographic recording layer containing:

- (A) a binder compound having a reactive group;
- (B) a polymerizable compound having an ethylenic double bond;
- (C) a photoinitiator;
- (D) a cross-linking agent which reacts with the reactive group in the binder compound,

wherein the photoinitiator contains a compound represented by Formula (1):

Formula (1)



wherein Dye^+ is a cationic dye, each R^1 to R^4 is independently a substituted or unsubstituted alkyl, aryl, aralkyl, alkenyl, alkynyl, heterocyclic group, or a cyano group, provided that two or more of R^1 to R^4 can form a ring, the method comprising the steps of:

(i) irradiating the holographic recording medium with a light based on information to be recorded so as to activate the photoinitiator;

(ii) polymerizing the activated photoinitiator with the polymerizable compound to form the holographic image; and

(iii) irradiating the holographic recording medium with a light or subjecting the holographic recording medium so as to stabilize the holographic image after completion of the step (ii).